[0099] **CLAIMS**

[0100] We claim:

1. A method of reducing the risk of detachment of photoresist from an underlying substrate during development of a photoresist pattern using a fluid developer, comprising: controlling the surface composition of said underlying substrate so that a contact angle formed between said underlying substrate with a developer used to develop said photoresist pattern is about 20 degrees or greater.

2. A method in accordance with Claim 1, wherein said photoresist pattern contains features which are less than about 120 nm in size.

3. A method in accordance with Claim 2, wherein said photoresist pattern contains features which are less than about 90 nm in size.

4. A method in accordance with Claim 3, wherein said contact angle formed between said underlying substrate with a developer used to develop said photoresist pattern is about 30 degrees or greater.

5. A method in accordance with Claim 1, wherein controlling of said surface composition of said underlying substrate is accomplished by controlling the composition of a depositing film which forms the surface of said underlying substrate.

6. A method in accordance with Claim 5, wherein said depositing film is deposited using plasma enhanced CVD.

7. A method in accordance with Claim 6, wherein said depositing film is a DARC.

8. A method in accordance with Claim 7, wherein an amount of a Group IV element present in said DARC is controlled, whereby said contact angel is controlled.

9. A method in accordance with Claim 8, wherein said Group IV element is carbon.

10. A method in accordance with Claim 8, wherein said Group IV element is silicon.

11. A method in accordance with Claim 8, wherein said Group IV element is germanium.

12. A method in accordance with Claim 8, wherein said DARC is an inorganic DARC.

13. A method in accordance with Claim 5 or Claim 6, or Claim 7, or Claim 8, wherein said film deposition employs a power input which includes the use of a plurality of frequencies.

14. A method in accordance with Claim 13, wherein said power input includes use of a plurality of RF power inputs.

15. A method in accordance with Claim 13, wherein said power input includes the use of both microwave and RF power inputs.

16. A method in accordance with Claim 1, wherein controlling of said surface composition of said underlying substrate is accomplished by treating said surface with a plasma.

17. A method in accordance with Claim 16, wherein said surface being treated is a DARC.

18. A method in accordance with Claim 17, wherein said plasma is a hydrogen-comprising plasma which makes hydrogen species available to react with said DARC surface.

19. A method in accordance with Claim 18, wherein said plasma is a hydrogen plasma.

20. A method in accordance with Claim 17, wherein said plasma is a helium-comprising plasma.

21. A method in accordance with Claim 20, wherein said plasma is a helium plasma.

22. A method in accordance with Claim 1, wherein controlling of said surface composition of said underlying substrate is accomplished by controlling the composition of a capping layer deposited over a DARC.

23. A method in accordance with Claim 22, wherein said depositing film is deposited using plasma enhanced CVD.

24. A method in accordance with Claim 22 or Claim 23, wherein said capping layer is silicon-containing.

25. A method in accordance with Claim 22 or Claim 23, wherein said capping layer is essentially α-carbon.

26. A method in accordance with Claim 24, wherein said silicon-containing capping layer is α-silicon.

27 A method in accordance with Claim 1, or Claim 2, or Claim 8, or Claim 16, or Claim 22, wherein said developer is a water-based developer.

28. A method in accordance with Claim 27, wherein said developer has the property

of being basic.

29. A method in accordance with Claim 1 or Claim 2, or Claim 8, or Claim 16, or Claim 22, wherein said contact angle ranges from about 35 degrees to about 90 degrees.

30. A method of reducing photoresist poisoning when the photoresist is a chemically amplified positive photoresist which produces an acid in pattern areas of the photoresist which are to be removed upon development, comprising:

controlling the surface composition of a substrate underlying said photoresist by plasma treatment of said surface.

31. A method in accordance with Claim 30, wherein said plasma treatment employs a plasma generation power input including more than one frequency.

32. A method in accordance with Claim 30 or Claim 31, wherein said substrate underlying said photoresist is a DARC.

33. A method in accordance with Claim 32, wherein said DARC is an inorganic DARC.

34. A method in accordance with Claim 33, wherein said DARC is a silicon-containing DARC, and wherein said plasma used for treatment is a hydrogen-containing plasma.

35. A method in accordance with Claim 32, wherein said DARC is an organic DARC, and wherein said plasma used for treatment is a hydrogen-containing plasma.

36. A method in accordance with Claim 32, wherein said plasma used for treatment is a helium-containing plasma.

37. A method in accordance with Claim 33, wherein said DARC is a silicon-containing DARC, and wherein said plasma used for treatment is a helium-containing plasma.

38. A method in accordance with Claim 32, wherein said DARC is an organic DARC, and wherein said plasma used for treatment is a helium-containing plasma.

39. A method of reducing photoresist poisoning when the photoresist is a chemically amplified positive photoresist which produces an acid in pattern areas of the photoresist which are to be removed upon development, comprising:

controlling the surface composition of a substrate underlying said photoresist by PECVD deposition of a capping film of α-silicon over an underlying inorganic nitrogen-free DARC .

40. A method of reducing photoresist poisoning when the photoresist is a chemically amplified positive photoresist which produces an acid in pattern areas of the

photoresist which are to be removed upon development, comprising:

controlling the surface composition of a substrate underlying said photoresist by PECVD deposition of a capping film of α-carbon over an underlying inorganic nitrogen-free DARC .